New Claims

1. A transformer for low frequency applications of from 50Hz to 1000Hz, said transformer comprising:

a core having a cylindrical symmetry around a main revolution axis, said core being formed of a soft isotropic magnetic composite material composed of iron and resin, said core including integral cooling fins comprising the soft isotropic composite material projecting from an external surface of said core; and

windings enclosed in said core and magnetically coupled with said core.

2. The transformer as claimed in claim 1 wherein said core is formed by core sections.

3. The transformer as claimed in claim 1 wherein said fins are integrally formed with said core during pressing of said core in a single operation process.

4. The transformer as claimed in claim 1 wherein said fins are machined in said core in a machining operation.

5. The transformer as claimed in claim 1 wherein said fins are oriented in the direction of the magnetic flux circulation of said core and in planes of said cylindrical symmetry passing through said revolution axis.

6. The transformer as claimed in claim 1 wherein said core defines a winding window having a circular cross-section in a plane of said cylindrical symmetry passing through said revolution axis.

7. The transformer as claimed in claim 1 wherein said core defines a winding window having an oval cross-section in a plane of said cylindrical symmetry passing through said revolution axis.

8. The transformer as claimed in claim 1 wherein said core defines a winding window having a rectangular cross-section, with or without round corners in a plane of said cylindrical symmetry passing through said revolution axis.

9. The transformer as claimed in claim 1 wherein said core defines a winding window having a trapezoidal cross-section, with or without round corners in a plane of said cylindrical symmetry passing through said revolution axis.

~~11.~~ 10 The transformer as claimed in claim 1 wherein said core is provided with one or more slots placed in planes of said cylindrical symmetry passing through said revolution axis to reduce eddy currents.

~~12.~~ 11 The transformer as claimed in claim 1, further comprising:

a primary winding to connect said transformer directly to an AC power supply having a frequency in the range of 50Hz to 1000Hz; and

one or more secondary windings connected to a rectifier using diodes and/or thyristors and/or transistors.

~~13.~~ 12 The transformer as claimed in claim 1, characterized in that said transformer has a low level of audible noise when supplied with AC currents at low frequencies in the range of 50Hz to 1000Hz, and substantially no magnetically induced vibrations in said magnetic composite materials thereby minimizing audible noise.

13 ~~14.~~ The transformer as claimed in claim 1, said transformer having a low level of electromagnetic interference (EMI) and a low external stray magnetic field.

14 ~~15.~~ The transformer as claimed in claim 1, characterized in that when said transformer is connected to an AC power supply having a frequency of from 50Hz to 1000Hz, input currents present a low total harmonic distortion (THD).

15 ~~16.~~ The transformer as claimed in claim 1, characterized in that said transformer has small values of form factor (ratio between the height along said revolution axis and the external diameter of said core) when adapted to specific constraints of low profile applications.

16 ~~17.~~ An inductor for low frequency applications, DC to 1000Hz, said inductor comprising:

a core having a cylindrical symmetry around a main revolution axis, said core being formed of a soft isotropic magnetic composite material composed of iron and resin, said core including integral cooling fins comprising the soft isotropic magnetic composite material projecting from an external surface of said core; and

a winding enclosed in said core and disposed about a central column of said core and magnetically coupled with the said core.

17 ~~18.~~ The inductor as claimed in claim 17 wherein said magnetic core is provided with one or more airgaps, said core having two core sections, said airgaps being formed by separating said two sections or by using a central column and an external shell of different lengths.

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18 ~~19.~~ The inductor as claimed in claim 17 wherein said core is formed by core sections.

19 ~~20.~~ The inductor as claimed in claim 17 wherein said fins are integrally formed with said core during pressing of said core in a single operation process.

20 ~~21.~~ The inductor as claimed in claim 17 wherein said fins are machined in said core in a machining operation.

21 ~~22.~~ The inductor as claimed in claim 17 wherein said fins are oriented in the direction of the magnetic flux circulation of said core and in planes of said cylindrical symmetry passing through said revolution axis.

22 ~~23.~~ The inductor as claimed in claim 17 wherein said core defines a winding window having a circular cross-section in a plane of said cylindrical symmetry passing through said revoluuion axis.

23 ~~24.~~ The inductor as claimed in claim 17 wherein said core defines a winding window having an oval cross-section in a plane of said cylindrical symmetry passing through said revolution axis.

24 ~~25.~~ The inductor as claimed in claim 17 wherein said core defines a winding window having a rectangular cross-section with or without round corners in a plane of said cylindrical symmetry passing through said revolution axis.

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25 ~~26.~~ The inductor as claimed in claim 17 wherein said core defines a winding window having a trapezoidal cross-section, with or without round corners in a plane of said cylindrical symmetry passing through said revolution axis.

26 ~~28.~~ The inductor as claimed in claim 17 wherein said core is provided with one or more slots placed in planes of said cylindrical symmetry passing through said revolution axis to reduce eddy currents.

27 ~~29.~~ The inductor as claimed in claim 17, characterized by having a low level of audible noise when supplied with AC currents at low frequencies in the range of 50Hz to 1000Hz and having substantially no magnetically induced vibrations in said soft magnetic composite materials.

28 ~~30.~~ The inductor as claimed in claim 17, characterized in that when said inductor is connected to an AC power supply having a frequency of from 50Hz to 1000Hz, input currents present a low total harmonic distortion (THD).

29 ~~31.~~ The inductor as claimed in claim 17, characterized in that copper losses generated by a proximity effect in said winding are minimized when several individual inductors which possess an airgap of small width are stacked.

30 ~~32.~~ The inductor as claimed in claim 17, characterized in that said inductor has small values of form factor (ratio between the height along said revolution axis and the external diameter of said core) when adapted to specific constraints of low profile applications.

31 ~~33.~~ The inductor as claimed in claim 17, characterized in that said inductor has a low level of audible noise when supplied with AC currents at low frequencies in the range of DC to 1000Hz and substantially no magnetically induced vibrations in said magnetic composite materials thereby minimizing audible noise.